

WHAT IS CLAIMED IS:

1. A method of evaluating a printing medium for use in a printing process, comprising:

generating a set of spectral data from a sample of the printing medium; and

analysing the set of spectral data, wherein analysis of the set of spectral data comprises:

- detecting spectral data of the set indicative of features of the printing medium related to performance of said printing medium in the printing process; and
- predicting the performance of the printing medium in the printing process in response to the detected spectral data of the set indicative of performance-related printing medium features.

2. A method of evaluating a printing medium as defined in claim 1, wherein analysis of the set of spectral data further comprises:

- accepting or refusing the printing medium for use in the printing process in response to the printing medium performance prediction.

3. A method of evaluating a printing medium as defined in claim 1, wherein generating a set of spectral data comprises:

- submitting the sample of printing medium to FT-IR interferometric analysis.

4. A method of evaluating a printing medium as defined in claim 1, wherein generating a set of spectral data comprises:

- submitting the sample of printing medium to FT-NIR interferometric analysis.

5. A method of evaluating a printing medium as defined in claim 1, wherein generating a set of spectral data comprises:

- irradiating the sample of printing medium with light in a specific spectral range of the infrared spectrum.

6. A method of evaluating a printing medium as defined in claim 1, wherein

generating a set of spectral data comprises:

- irradiating the sample of printing medium with light in a specific spectral range of the near-infrared spectrum.

7. A method of evaluating a printing medium as defined in claim 1, wherein generating a set of spectral data comprises:

- submitting the sample of printing medium to FT-IR interferometric analysis;
- submitting the sample of printing medium to FT-NIR interferometric analysis; and
- obtaining different and complementary spectral data from (a) the FT-IR interferometric analysis and (b) the FT-NIR interferometric analysis.

8. A method of evaluating a printing medium as defined in claim 1, wherein generating a set of spectral data comprises:

- irradiating the sample of printing medium with light having a predetermined frequency characteristic;
- detecting a radiation response from the irradiated sample of printing medium; and
- extracting the set of spectral data from the radiation response.

9. A method of evaluating a printing medium as defined in claim 1, wherein generating a set of spectral data comprises:

- generating light having a predetermined frequency characteristic;
- irradiating the sample of printing medium with the generated light having a predetermined frequency characteristic;
- selectively absorbing energy from the irradiating light through the printing medium;
- producing from energy of the irradiating light not absorbed by the printing medium a time distributed radiation response related to properties of the printing medium;
- collecting the time distributed radiation response;
- converting the collected time distributed radiation response to an analog response signal;
- converting the analog response signal to a digital response signal;
- supplying the digital response signal to a computer for a given period of time to provide a time domain response; and

in the computer, mathematically converting the time domain response to a frequency domain response by a time-to-frequency domain transformation to thereby produce the set of spectral data.

10. A method of evaluating a printing medium as defined in claim 9, comprising representing the set of spectral data under the form of an energy/frequency pattern.

11. A method of evaluating a printing medium as defined in claim 9, comprising representing the set of spectral data under the form of a graph of absorbance versus wavenumber.

12. A method of evaluating a printing medium as defined in claim 8, wherein:

- irradiating the sample of printing medium with light comprises directing light radiation toward the sample of printing medium at an angle; and
- detecting a radiation response comprises collecting a reflected scattered light radiation response.

13. A method of evaluating a printing medium as defined in claim 8, wherein:

- irradiating the sample of printing medium comprises propagating light through the printing medium; and
- detecting a radiation response comprises collecting a scattered radiation response produced by the light propagated through the sample of printing medium.

14. A method of evaluating a printing medium as defined in claim 8, wherein generating a set of spectral data further comprises:

- enclosing the sample of printing medium into a gas-tight enclosure to prevent evaporation of volatile components and thereby obtain maximal information.

15. A method of evaluating a printing medium as defined in claim 1, wherein:

- generating a set of spectral data comprises producing a set of FT-IR data; and
- detecting spectral data of the set indicative of features of the printing medium related to performance of said printing medium in the printing process comprises comparing the

produced set of FT-IR data with a reference set of FT-IR data obtained from a reference printing medium.

16. A method of evaluating a printing medium as defined in claim 15, wherein:

analysis of the set of spectral data further comprises accepting or refusing the printing medium for use in the printing process in response to the printing medium performance prediction; and

accepting or refusing the printing medium comprises:

- defining tolerance criteria to deviations between the produced set of FT-IR data and the reference set of FT-IR data;
- applying the tolerance criteria to the deviations between the produced set of FT-IR data and the reference set of FT-IR data; and
- accepting the printing medium for use in the printing process when the deviations between the produced set of FT-IR data and the reference set of FT-IR data are situated within limits established by the tolerance criteria.

17. A method of evaluating a printing medium as defined in claim 16, wherein defining tolerance criteria comprises:

- obtaining sets of spectral data for a plurality of printing media of slightly different chemical compositions;
- testing physical, mechanical and functional properties of each printing medium;
- correlating the physical, mechanical and functional properties of each printing medium with the corresponding set of spectral data; and
- determining an impact on the physical, mechanical and function properties of deviations of the sets of spectral data with respect to a reference set of spectral data corresponding to a reference sample of printing medium having known physical, mechanical and functional properties.

18. A method of evaluating a printing medium as defined in claim 1, wherein the printing medium performance prediction also comprises:

- constructing training sets of spectral data for each of a plurality of printing medium parameters; and

- indicating variations of the spectral data corresponding to variations of said printing medium parameters.

19. A method of evaluating a printing medium as defined in claim 1, wherein the printing medium performance prediction comprises:

- identifying portions of a currently generated and reference sets of spectral data in which deviations occur; and
- associating the deviations with features of the printing medium indicative of potential problems and/or compromised performance if introduced into the printing process.

20. A method of evaluating a printing medium as defined in claim 1, wherein the printing medium performance prediction further comprises:

- obtaining, through experimentation, sets of spectral data corresponding to printing media having given properties;
- storing the sets of spectral data obtained through experimentation along with indications about the features of the respective printing media; and
- finding one of the stored sets of spectral data best fitting a set of spectral data from a currently tested sample of printing medium within previously defined tolerance criteria to predict properties of the currently tested printing medium and a behaviour and performance of said currently tested printing medium when introduced into the printing process.

21. A device for evaluating a printing medium for use in a printing process, comprising:

means for generating a set of spectral data from a sample of the printing medium; and

means for analysing the set of spectral data, wherein the analysing means comprises:

- means for detecting spectral data of the set indicative of features of the printing medium related to performance of said printing medium in the printing process; and
- means for predicting the performance of the printing medium in the printing process in response to the detected spectral data of the set indicative of performance-related printing medium features.

22. A device for evaluating a printing medium as defined in claim 21, wherein the analysing means further comprises:

- means for accepting or refusing the printing medium for use in the printing process in response to the printing medium performance prediction.

23. A device for evaluating a printing medium for use in a printing process, comprising:

a generator of a set of spectral data from a sample of the printing medium; and

an analyser of the set of spectral data, wherein the analyser comprises:

- a detector of the spectral data of the set indicative of features of the printing medium related to performance of said printing medium in the printing process; and
- a predictor of the performance of the printing medium in the printing process in response to the detected spectral data of the set indicative of performance-related printing medium features.

24. A device for evaluating a printing medium as defined in claim 23, wherein the analyser comprises:

- a decision-making computer system for accepting or refusing the printing medium for use in the printing process in response to the prediction of the performance of the printing medium conducted by the predictor.

25. A device for evaluating a printing medium as defined in claim 23, wherein the generator comprises a FT-IR interferometric analysis system.

26. A device for evaluating a printing medium as defined in claim 23, wherein the generator comprises a FT-NIR interferometric analysis system.

27. A device for evaluating a printing medium as defined in claim 23, wherein the generator comprises:

- a source of light in a specific spectral range of the infrared spectrum for irradiating the sample of printing medium.

28. A device for evaluating a printing medium as defined in claim 23, wherein the generator comprises:

- a source of light in a specific spectral range of the near-infrared spectrum for irradiating the sample of printing medium.

29. A device for evaluating a printing medium as defined in claim 23, wherein the generator comprises:

- a FT-IR interferometric analysis system;
- a FT-NIR interferometric analysis system; and
- a compiler of different and complementary spectral data from (a) the FT-IR interferometric analysis system and (b) the FT-NIR interferometric analysis system.

30. A device for evaluating a printing medium as defined in claim 23, wherein the generator comprises:

- a source of light having a predetermined frequency characteristic for irradiating the sample of printing medium;
- a detector of a radiation response from the irradiated sample of printing medium; and
- an extractor of the set of spectral data from the radiation response.

31. A device for evaluating a printing medium as defined in claim 30, further comprising a portable probe unit incorporating the source of light and the detector of radiation purpose for remotely probing a printing medium on site.

32. A device for evaluating a printing medium as defined in claim 30, wherein:

- the source of light is oriented for directing light radiation toward the sample of printing medium at an angle; and
- a detector of a radiation response comprises a collector of a reflected scattered light radiation response.

33. A device for evaluating a printing medium as defined in claim 30, wherein:

- a source of light is oriented for propagating light through the sample of printing medium; and

- the detector of a radiation response comprises a collector of a scattered radiation response produced by the light propagated through the sample of printing medium.

34. A device for evaluating a printing medium as defined in claim 23, wherein the generator of a set of spectral data further comprises:

- a gas-tight enclosure for enclosing the sample of printing medium to prevent evaporation of volatile components and thereby obtain maximal information.

35. A device for evaluating a printing medium as defined in claim 23, wherein:

- the generator of a set of spectral data is a generator of a set of FT-IR data; and
- the detector of spectral data of the set indicative of features of the printing medium related to performance of said printing medium in the printing process comprises a comparator of the produced set of FT-IR data with a reference set of FT-IR data obtained from a reference printing medium.

36. A device for evaluating a printing medium as defined in claim 35, wherein the analyser further comprises:

- means for defining tolerance criteria to deviations between the generated set of FT-IR data and the reference set of FT-IR data;
- means for applying the tolerance criteria to the deviations between the generated set of FT-IR data and the reference set of FT-IR data; and
- means for accepting the printing medium for use in the printing process when the deviations between the generated set of FT-IR data and the reference set of FT-IR data are situated within limits established by the tolerance criteria.

37. A device for evaluating a printing medium as defined in claim 36, wherein the means for defining tolerance criteria comprises:

- means for obtaining sets of spectral data for a plurality of printing media of slightly different chemical compositions;
- means for obtaining physical, mechanical and/or functional properties of each printing medium;
- means for correlating the physical, mechanical and/or functional properties of each printing

- medium with the corresponding set of spectral data; and
- means for determining an impact on the physical, mechanical and/or functional properties of deviations of the sets of spectral data with respect to a reference set of spectral data corresponding to a reference sample of printing medium having known physical, mechanical and functional properties.

38. A device for evaluating a printing medium as defined in claim 23, wherein the predictor comprises:

- means for constructing training sets of spectral data for each of a plurality of printing medium parameters; and
- means for indicating variations of the spectral data corresponding to variations of said printing medium parameters.

39. A device for evaluating a printing medium as defined in claim 23, wherein the predictor comprises:

- means for identifying portions of a currently generated and reference sets of spectral data in which deviations occur; and
- means for associating the deviations with features of the printing medium indicative of performance in the printing process.

40. A device for evaluating a printing medium as defined in claim 23, wherein the predictor comprises:

- means for obtaining, through experimentation, sets of spectral data corresponding to printing media having given properties;
- means for storing the sets of spectral data obtained through experimentation along with indications about the features of the respective printing media; and
- means for finding one of the stored sets of spectral data best fitting a set of spectral data from a currently tested sample of printing medium within previously defined tolerance criteria to predict properties of the currently tested printing medium and a behaviour and performance of said currently tested printing medium when introduced into the printing process.